



The genus *Notophthiracarus* of New Zealand (Acari: Oribatida: Phthiracaridae): three new species and a key to 24 described species

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Abstract

The genus *Notophthiracarus* (Acari: Oribatida: Phthiracaridae) was represented in New Zealand by 21 species prior to this work. In this paper, three new species of *Notophthiracarus* from New Zealand are described: *Notophthiracarus dugdalei* sp. nov. and *Notophthiracarus matatitapu* sp. nov. from Darran Mts., Tutoko Bench, and *Notophthiracarus whakau* sp. nov. from the Red Island, Mercury Islands. A key to all known species of *Notophthiracarus* in New Zealand is also provided.

Key words: Soil mites, Oribatida, Phthiracaridae, *Notophthiracarus*, new species, New Zealand

Introduction

The genus *Notophthiracarus* (Oribatida: Phthiracaridae) was erected by Ramsay (1966) with *Phthiracarus maculatus* Trägårdh, 1931 as its type species. The species of this genus are characterized by notogaster with 15 pairs of setae, rarely neotrichous; nine pairs of genital setae arranged in a single row, distance between g_6 and g_9 longer than that between g_5 and g_4 or g_3 and g_4 ; 5 pairs of setae on anoadanal plates present, setae ad_1 and ad_2 remote from paraxial margin, normal, minute or vestigial; setae v' on femora I (if present) short; setae l' on genua IV always present; setae ft'' on tarsi I normal. It is a relatively large genus of the family Phthiracaridae, with wide distribution except Holarctic Region. Up to now, more than 140 species were included in this genus (Subías 2012). Prior to this work, 21 species belonging to this genus have been recorded from New Zealand (Ramsay 1966; Niedbala 1989, 1993, 2000, 2006). During the first author's visit to Landcare Research in Auckland in April 2012, we identified three new species of this genus from New Zealand Arthropod Collection. The main purpose of this paper is to give detailed descriptions of the three new species. A key to all 24 species of *Notophthiracarus* known from New Zealand was also provided to facilitate identification.

This is the second of our series of papers on New Zealand ptyctimous mites. The first one deals with two new species of *Austrophthiracarus*, with a key to all six species of the genus recorded in New Zealand (Liu & Zhang 2013).

Methods

Measurements and descriptions are based on specimens mounted in temporary cavity slides that were studied using a light microscope equipped with a drawing attachment.

Terminology generally follows Niedbala (1992, 2000). The unit of measurement is micrometre (μm).

All holotype specimens are deposited in the New Zealand Arthropod Collection, Landcare Research, Auckland (NZAC). Paratypes are split between NZAC and Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Changchun (NIGA).

Descriptions of new species

Notophthiracarus dugdalei sp. nov.

(Figs. 1–10)

Material examined: Holotype: adult (NZAC, in alcohol, 77/14), New Zealand: FD, Darran Mts., Tutoko Bench, Camp, 950 m a.s.l., from mosses under *Dracophyllum* scrub, 13 Jan. 1977, leg. J. S. Dugdale. Paratype: one adult (NIGA, in alcohol, 77/14), same data as holotype.

Etymology. Named after collector, Dr John S. Dugdale, who is a retired entomologist (taxonomist of Lepidoptera) of Landcare Research. He is also the collector of many litter samples preserved in NZAC.

Description. *Measurements.* Holotype: Prodorsum: length 500, width 350, height 160, setae: *ss* 28, *ro* 20, *le* 10, *in* 275, *ex* 30; notogaster: length 995, width 690, height 625; setae: *c*₁ 280, *d*₁ 210, *e*₁ 210, *h*₁ 250, *ps*₁ 300, *ps*₄ 230; ventral region: *ad*₁ 180, *an*₁ 110, *an*₂ 110; genitoaggenital plate 180×250, anoadanal plate 170×440. Paratype: Prodorsum: length 490, width 330, height 155; notogaster: length 890, width 660, height 610.

Integument. Colour grey-brown. Surface of body finely punctate, except prodorsum foveolate.

Prodorsum (Figs. 1–3). Median crista and lateral carinae absent; sigillar fields distinct, dorsal field short, not reaching insertions of rostral setae; posterior furrows absent; sensilli (*ss*) short with broad head, covered with minute spines distally; interlamellar setae (*in*) long and erect, covered with minute spines in distal half; rostral setae (*ro*) short, thin and spiniform; exobothridial (*ex*) and lamellar (*le*) setae short and fine; comparative length: *in*>*ex*>*ss*>*ro*>*le*.

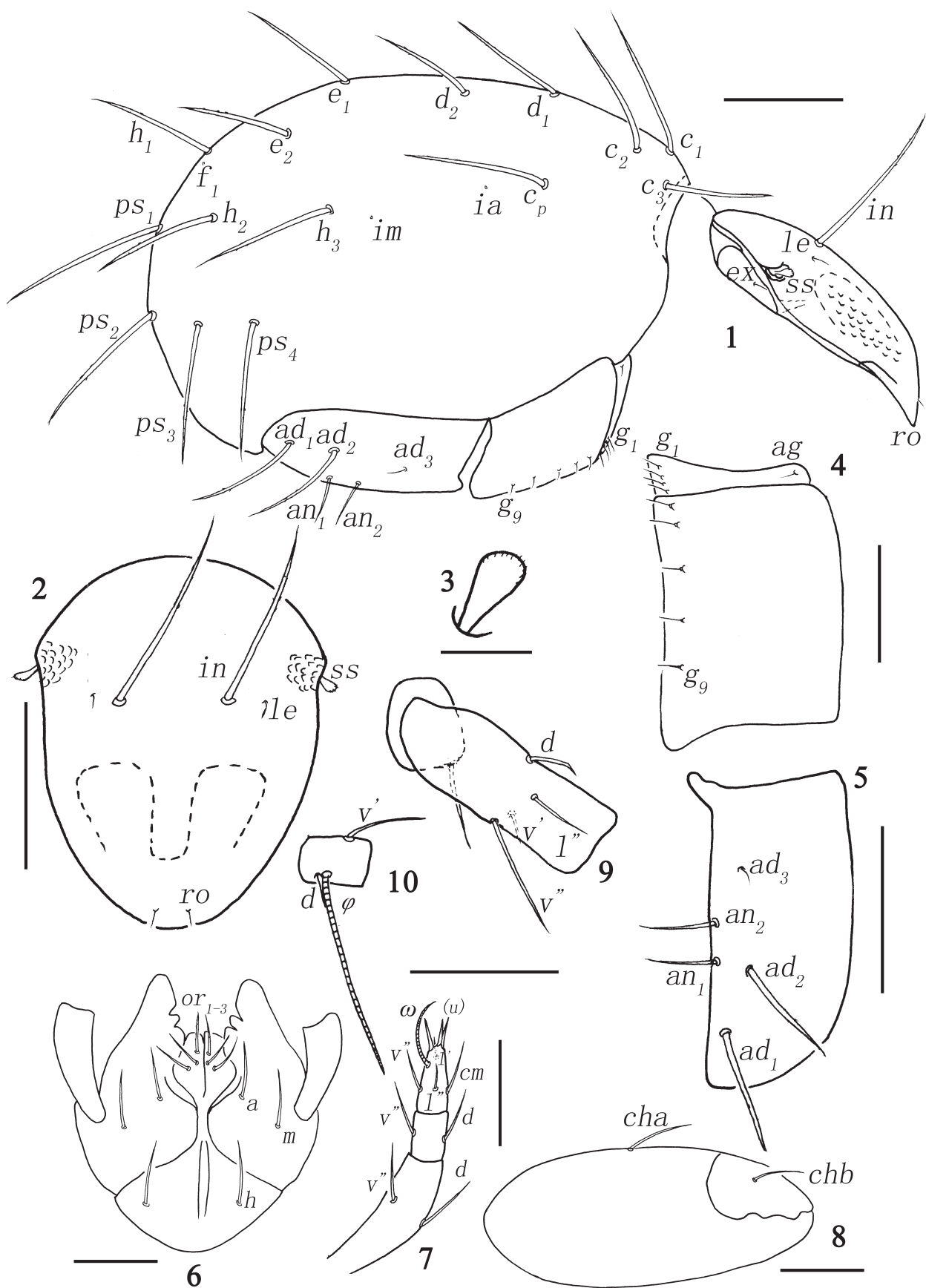
Notogaster (Fig. 1). 15 pairs of setae present, moderately long (*c*₁>*c*₁–*d*₁), robust, covered with small spines in distal half, setae *c*₁ and *ps*₁ longest, setae *d*₂ and *e*₂ shortest; setae *c*₂ more far away from anterior border than setae *c*₁ and *c*₃; setae *ps*₄ situated posterior to setae *ad*₁; vestigial setae *f*₁ positioned posterior to setae *h*₁; two pairs of lyrifissures *ia* and *im* present.

Gnathosoma (Figs. 6–8). Subcapitulum normal (Fig. 6); setae *h*, *m*, and *a* simple and smooth; setae *h* shorter than distance between them; adoral seta *or*₁ apparently flat with barbs; *or*_{2–3} simple and smooth; palp (Fig. 7) 4-segmented, with femur and genu fused; palpal setation: 0-2-2-7(1); supracoxal seta simple and smooth; chelicera (Fig. 8) with two smooth setae (*cha*, *chb*).

Ano-genital region (Figs. 1, 4–5). Nine pairs of genital setae (*g*) arranged with formula: 5: 4; one pair of aggenital setae (*ag*) present; anoadanal plates each with five setae (*ad*, *an*), setae *ad*₁ and *ad*₂ barbed, longer and thicker than other setae; setae *ad*₃ smooth and minute; comparative length: *ad*₁=*ad*₂>*an*₁=*an*₂>*ad*₃.

Legs (Figs. 9–10). Setal counts for leg segments (without tarsi): I: 1-4-2(2)-5(1); II: 1-3-3(1)-3(1), III: 2-2-1(1)-2(1), IV: 2-1-1-2(1); setae *d* on femora I inserted at level of setae *v*''; setae *a*'' on tarsi I and setae *ft*'' on tarsi II curved distally; setae *a*'' on tarsi II curved distally; setae *s* and *pv*' on tarsi IV present; setae *s* on tarsi I and II absent.

Remark. This new species is similar to New Zealand species *Notophthiracarus incomparabilis* Niedbala, 2000 in sharing the following features: the presence of minute lamellar, rostral and *ad*₃ setae, exobothridial setae present, setae *ps*₄ situated posterior to setae *ad*₁, vestigial setae *f*₁ positioned posterior to setae *h*₁, two pairs of lyrifissures *ia* and *im* present, genital setae with formula: 5: 4, and setae *v*' on femora I present. However, the new species can be easily distinguished from *N. incomparabilis* by the following ten characters (a versus b): in *N. dugdalei* sp. nov., (1a) surface of prodorsum foveolate; (2a) lateral carinae absent; (3a) dorsal region of sigillar fields short, not reach the insertions of rostral setae and not bifurcate anteriorly; (4a) sensilli shorter (*ss* 28), with head not pointed distally; (5a) sinus small and narrow; (6a) interlamellar setae much shorter (*in* 275); (7a) setae *ps*₄ and *c*_p much longer, setae *d*₂ and *e*₂ shortest, other notogastral setae relatively shorter (e.g. *c*₁ 280); (8a) lyrifissures *ia* situated posterior to setae *c*_p; (9a) setae *ad*₁ and *ad*₂ equal in length; (10a) setae *h* of mentum shorter than distance between them; in *N. incomparabilis*, (1b) surface of body finely punctate and very weakly foveolate; (2b) lateral carinae present; (3b) dorsal region of sigillar fields long, reaching the insertions of rostral setae and bifurcate anteriorly; (4b) sensilli longer (*ss* 40), with head pointed distally; (5b) sinus large and round, much broader; (6b) interlamellar setae much longer (*in* 353); (7b) setae *ps*₄ and *c*_p shortest, other notogastral setae relatively longer (e.g. *c*₁ 349); (8b) lyrifissures *ia* situated dorsal to setae *c*_p; (9b) setae *ad*₁ and *ad*₂ not equal in length; (10b) setae *h* of mentum longer than distance between them.



FIGURES 1–10. *Notophthiracarus dugdalei* sp. nov.: 1, lateral view of body (legs removed); 2, prodorsum, dorsal view; 3, sensillus, dorsal view; 4, left side of genito-aggenital plate; 5, left side of anoadanal plate; 6, subcapitulum, palpi removed; 7, palp, antiaxial view; 8, chelicera, antiaxial view; 9, trochanter and femur I; 10, tibia IV. Scale bars: 1, 2, 5, 9, 10=200 μ m; 4=100 μ m; 6, 7, 8=50 μ m; 3=25 μ m

***Notophthiracarus matatatipu* sp. nov.**

(Figs. 11–20)

Material examined: Holotype: adult (NZAC, in alcohol, 77/27), New Zealand: FD, Darran Mts., Tutoko Bench, 1585 m.a.s.l., from crevice plants (wet, sheltered), 10 Jan., 1977, leg. J. S. Dugdale. Paratypes: four adults (NZAC, in alcohol, 77/27), same data as holotype; one adult (NIGA, in alcohol, 77/27), same data as holotype.

Etymology. Named after the habitat where the new species was collected; *matata* is Māori for crevice and *tipu* is Māori for plant; used here as a noun in apposition.

Description. Measurements. Holotype: Prodorsum: length 330, width 240, height 110, setae: *ss* 20, *ro* 50, *le* 15, *in* 185, *ex* 25; notogaster: length 670, width 430, height 410; setae: *c*₁ 200, *d*₁ 155, *e*₁ 150, *h*₁ 165, *ps*₁ 180; ventral region: *ad*₁ 160, *ad*₂ 155, *ad*₃ 55, *an*₁ 75, *an*₂ 75; genitoaggenital plate 145×150, anoadanal plate 130×255. Paratypes: Prodorsum: length 340–412, width 240–285, height 120–150; notogaster: length 680–855, width 435–542, height 455–550.

Integument. Colour grey-brown. Surface of body finely punctate, except prodorsum weakly foveolate.

Prodorsum (Figs. 11–13). Median crista and lateral carinae absent; sigillar fields distinct, dorsal field narrow, bifurcate anteriorly; posterior furrows absent; sensilli (*ss*) very short with narrow pedicel and fan-like head, covered with minute spines distally; interlamellar setae (*in*) long and erect, covered with minute spines in distal half; lamellar setae (*le*) minute; rostral setae (*ro*) short, thin and spiniform; exobothridial setae (*ex*) short and fine; comparative length: *in*>*ro*>*ex*>*ss*>*le*.

Notogaster (Fig. 11). 15 pairs of setae present, medium long (*c*₁>*c*₁–*d*₁), thick, covered with small spines in distal half, setae *c*₁ longest, setae *e*₂, *h*₃ and *ps*₄ shortest; setae *c*₂ more far away from anterior border than setae *c*₁ and *c*₃; vestigial setae *f*₁ positioned posterior to setae *h*₁; two pairs of lyrifissures *ia* and *im* present.

Gnathosoma (Figs. 16–18). Subcapitulum normal (Fig. 16); setae *h*, *m*, and *a* simple and smooth; setae *h* shorter than distance between them; adoral seta *or*₁ apparently flat with barbs; *or*_{2–3} simple and smooth; palp (Fig. 17) 4-segmented, with femur and genu fused; palpal setation: 0-2-2-7(1); supracoxal seta simple and smooth; chelicera (Fig. 18) with two smooth setae (*cha*, *chb*).

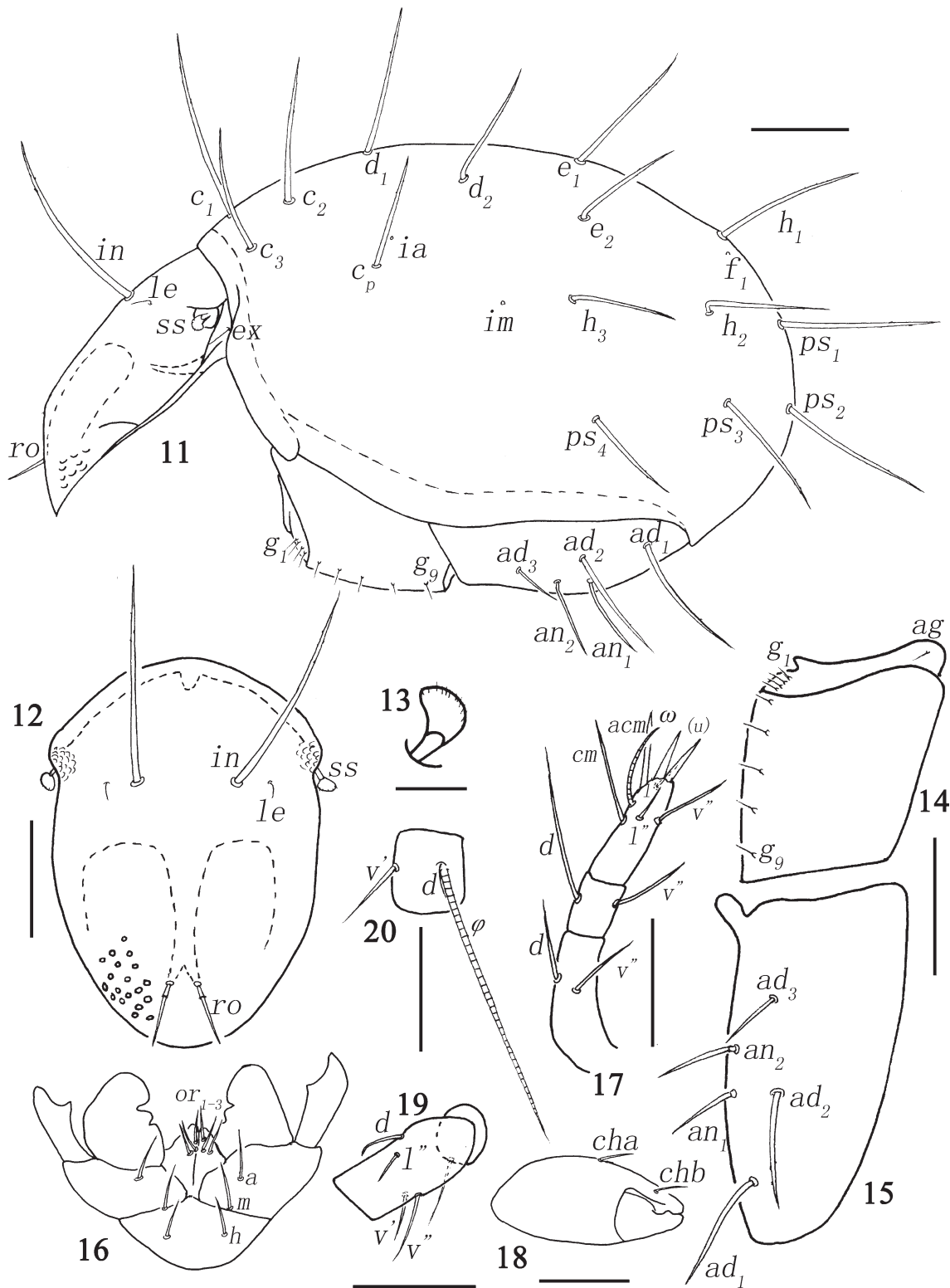
Ano-genital region (Figs. 11, 14–15). Nine pairs of genital setae (*g*) arranged with formula: 5: 4; one pair of aggenital setae (*ag*) present; anoadanal plates each with five setae (*ad*, *an*), setae *ad*₁ and *ad*₂ rough, straight, longer and thicker than other setae; setae *ad*₃ shorter and slightly thinner, but much thicker than genital setae; comparative length: *ad*₁>*ad*₂>*an*₁=*an*₂>*ad*₃.

Legs (Figs. 19–20). Setal counts for leg segments (without tarsi): I: 1-4-2(2)-4(1); II: 1-3-4(1)-3(1), III: 2-2-1(1)-2(1), IV: 2-1-1-2(1); setae *d* on femora I inserted at level of setae *v*''; setae *a*'' on tarsi I and setae *ft*'' on tarsi II curved distally; setae *a*'' on tarsi II curved distally; setae *s* and *pv*' on tarsi IV present; setae *s* on tarsi I and II absent.

Remark. This new species is similar to *Notophthiracarus quietus* Niedbala, 1989 in the presence of long and thick interlamellar setae, short lamellar setae, similar length of rostral setae, exobothridial setae present, dorsal region of sigillar fields bifurcate anteriorly, vestigial setae *f*₁ positioned posterior to setae *h*₁, two pairs of lyrifissures *ia* and *im* present, genital setae with formula: 5: 4, setae *ad*₃ much thicker than genital setae, and setae *v*' on femora I present, but can be easily distinguished from the latter species by the following eight characters (a versus b): in *N. matatatipu* sp. nov., (1a) lateral carinae and posterior furrows absent; (2a) dorsal region of sigillar fields narrow; (3a) head of sensilli fan-like; (4a) interlamellar setae much longer (*in* 185), *ex*>*ss*; (5a) notogastral setae much longer (e.g. *c*₁ 200, *c*₁>*c*₁–*d*₁), pointed distally and covered with small spines in distal half; (6a) setae *ad*₂ straight, not hooked distally; (7a) setae *h* of mentum shorter than distance between them; (8a) setae *d* on femora I not forked distally; in *N. quietus*, (1b) lateral carinae and posterior furrows present; (2b) dorsal region of sigillar fields broad; (3b) head of sensilli rounded; (4b) interlamellar setae shorter (*in* 129), *ex*=*ss*; (5b) notogastral setae much shorter (e.g. *c*₁ 106, *c*₁<*c*₁–*d*₁), obtuse distally and densely barbed in distal half; (6b) setae *ad*₂ hooked distally; (7b) setae *h* of mentum longer than distance between them; (8b) setae *d* on femora I forked distally.

This new species is also similar to the species *Notophthiracarus abstemius* Niedbala & Colloff, 1997 but differs by the following eight characters (a versus b): in *N. matatatipu* sp. nov., (1a) surface of notogaster finely punctate, not foveolate; (2a) dorsal region of sigillar fields narrow, bifurcate anteriorly and longer than lateral ones; (3a) exobothridial setae very short (*ex* 25), *ro*>*ex*; (4a) sensilli short (*ss* 20), with fanlike head and covered with minute spines distally; (5a) notogastral setae much longer (e.g. *c*₁ 200, *c*₁/*c*₁–*d*₁>1); (6a) vestigial setae *f*₁ positioned posterior to setae *h*₁; (7a) setae *h* of mentum shorter than distance between them; (8a) setae *d* on femora I inserted at level of setae *v*''; in *N. abstemius*, (1b) surface of notogaster finely foveolate; (2b) dorsal region of sigillar fields

broad, not bifurcate anteriorly and similar in length with lateral ones; (3b) exobothridial setae much longer ($ex\ 80$), $ex > ro$; (4b) sensilli much longer ($ss\ 40$), with fusiform and smooth head; (5b) notogastral setae much shorter (e.g. $c_1\ 124$, $c_1/c_1-d_1=0.72$); (6b) vestigial setae f_1 positioned anterior to setae h_1 ; (7b) setae h of mentum longer than distance between them; (8b) setae d on femora I inserted posterior to the level of setae v ".



FIGURES 11–20. *Notophthiracarus matatatipu* sp. nov.: 11, lateral view of body (legs removed); 12, prodorsum, dorsal view; 13, sensillus, dorsal view; 14, left side of genito-aggenital plate; 15, left side of anoadanal plate; 16, subcapitulum, palpi removed; 17, palp, antiaxial view; 18, chelicera, antiaxial view; 19, trochanter and femur I; 20, tibia IV. Scale bars: 11, 12, 14, 15=100 μ m; 16–20=50 μ m; 13=25 μ m.

***Notophthiracarus whakau* sp. nov.**

(Figs. 21–30)

Material examined: Holotype: adult (NZAC, in alcohol, 72/227), New Zealand: CL, Red I. Mercury Is., from mainly Myrsine litter, 24 Nov., 1972, leg. G. W. Ramsay. Paratype: one adult (NIGA, in alcohol, 72/227), same data as holotype.

Etymology. Named after the type locality of this new species: Whakau is the Māori name for the Red Island; used here as a noun in apposition.

Description. *Measurements.* Holotype: Prodorsum: length 330, width 215, height 160, setae: *ss* 80, *ro* 15, *le* 25, *in* 130; notogaster: length 632, width 365, height 420; setae: *c*₁ 150, *d*₁ 120, *e*₁ 132, *h*₁ 150, *ps*₁ 150, *ps*₄ 40; genitoaggenital plate 150×140, anoadanal plate 120×215. Paratype: Prodorsum: length 320, width 210, height 155; notogaster: length 610, width 358, height 410.

Integument. Colour yellowish. Surface of body covered with large foveolae. Median region of prodorsum and notogaster with distinct railing-like structure (reticulation-like in dorsal view), which is nearly identical in all specimens.

Prodorsum (Figs. 21–22). Strong median crista present; lateral carinae absent; sigillar fields indistinct; posterior furrows present; sensilli (*ss*) with long, narrow pedicel and short, pointed and covered with minute spines distally; interlamellar setae (*in*) long and strong, procumbent, densely barbed in distal half; lamellar (*le*) and rostral setae (*ro*) thin, smooth and short, but rostral setae slightly thicker; exobothridial setae (*ex*) vestigial; comparative length: *in*>*ss*>*le*>*ro*.

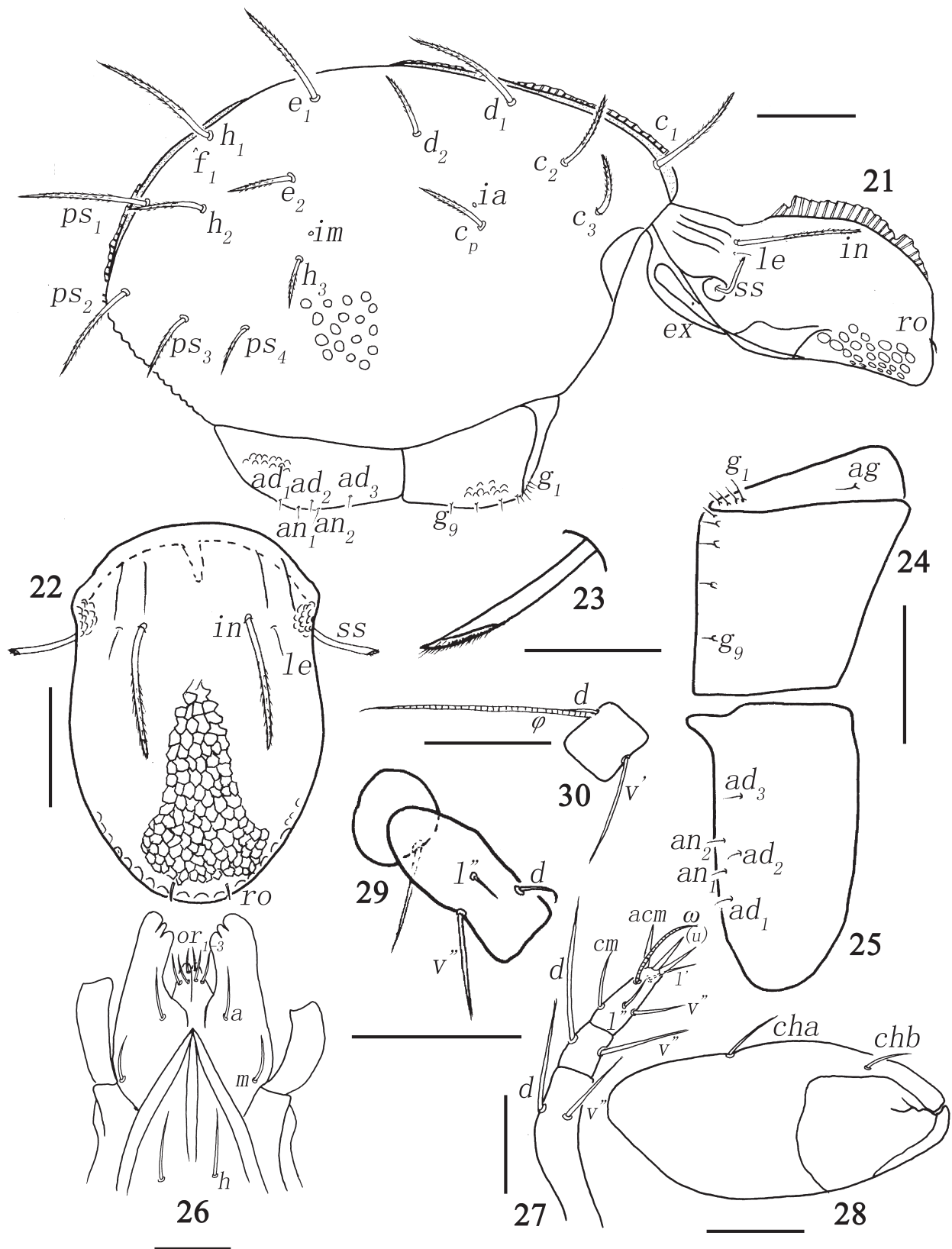
Notogaster (Fig. 21). Median crista present, interrupted from insertion level of setae *d*₂ to *e*₂; 15 pairs of notogastral setae present, medium long (*c*₁<*c*₁–*d*₁), robust, and densely barbed in distal half; setae *c*₁, *h*₁ and *ps*₁ longest, setae *ps*₄ shortest; setae *c*₂ more far away from anterior border than setae *c*₁ and *c*₃; setae *ps*₄ situated posterior to setae *ad*₁; vestigial setae *f*₁ positioned posterior to setae *h*₁; two pairs of lyrifissures *ia* and *im* present.

Gnathosoma (Figs. 26–28). Subcapitulum normal (Fig. 26); setae *h*, *m*, and *a* simple and smooth; setae *h* longer than distance between them; adoral seta *or*₁ apparently flat with barbs; *or*_{2–3} simple and smooth; palp (Fig. 27) 4-segmented, with femur and genu fused; palpal setation: 0-2-2-7(1); supracoxal seta simple and smooth; chelicera (Fig. 28) with two smooth setae (*cha*, *chb*).

Ano-genital region (Figs. 21, 24–25). Nine pairs of genital setae (*g*) arranged with formula: 5: 4; one pair of aggenital setae (*ag*) present; anoadanal plates each with five pairs of fine and minute setae (*an*, *ad*), adanal setae (*ad*) situated very close to paraxial margin.

Legs (Figs. 29–30). Setal counts for leg segments (without tarsi): I: 1-3-2(2)-5(1); II: 1-3-2(1)-3(1), III: 2-2-1(1)-2(1), IV: 2-1-1-2(1); on femora I, setae *d* situated near distal end of article, setae *v*' absent, and setae *v*" medium long; setae *a*" on tarsi I and setae *ft*" on tarsi II curved distally; setae *a*" on tarsi II curved distally; setae *s* and *pv*' on tarsi IV present; setae *s* on tarsi I and II absent.

Remark. This new species is similar to *Notophthiracarus unicarinatus* Niedbala, 2000 in the presence of median crista on prodorsum and notogaster, lateral carinae absent, lamellar and rostral setae short, exobothridial setae vestigial, vestigial setae *f*₁ positioned posterior to setae *h*₁, and anoadanal plates with fine and minute setae, but can be easily distinguished from the latter species by the following ten characters (a versus b): in *N. whakau* sp. nov., (1a) foveolae on surface of body obviously larger; (2a) dorsal region of prodorsum and notogaster with distinct railing-like structure; (3a) sensilli with short head; (4a) lamellar and rostral setae thin and smooth; (5a) interlamellar, lamellar and notogastral setae much shorter (*in* 130, *le* 25, *c*₁ 150, *c*₁/*c*₁–*d*₁=0.68); (6a) median crista on notogaster interrupted from the insertion level from setae *d*₂ to *e*₂; (7a) lyrifissures *im* positioned dorsally of setae *h*₃; (8a) formula of genital setae: 5: 4; (9a) setae *d* on femora I situated near distal end of article, setae *v*' absent, and setae *v*" normal; (10a) body size smaller (length of notogaster=632); in *N. unicarinatus*, (1b) foveolae on surface of body much smaller; (2b) dorsal region of prodorsum and notogaster without distinct railing-like structure; (3b) sensilli with elongate head; (4b) lamellar and rostral setae thick and spinose; (5b) interlamellar, lamellar and notogastral setae much longer (*in* 227, *le* 50.6, *c*₁ 227, *c*₁/*c*₁–*d*₁=1.04); (6b) median crista on notogaster not interrupted; (7b) lyrifissures *im* positioned ventrally of setae *h*₃; (8b) formula of genital setae: 6: 3; (9b) setae *d* on femora I situated far away from distal end of article, setae *v*' present, and setae *v*" very long; (10b) body size larger (length of notogaster=902).



FIGURES 21–30. *Notophthiracarus whakau* sp. nov.: 21, lateral view of body (legs removed); 22, prodorsum, dorsal view; 23, sensillus, dorsal view; 24, left side of genito-aggenital plate; 25, left side of anoadanal plate; 26, subcapitulum, palpi removed; 27, palp, antiaxial view; 28, chelicera, antiaxial view; 29, trochanter and femur I; 30, tibia IV. Scale bars: 21, 22, 24, 25, 29, 30=100 μ m; 23, 26–28=50 μ m.

Key to species of *Notophthiracarus* reported from New Zealand

- 1 16 pairs of notogastral setae present *N. comatus* Niedbala, 2000
- 15 pairs of notogastral setae present 2
- 2 Notogaster with anterior cowl *N. tripartitus* Niedbala, 1989
- Notogaster without anterior cowl 3
- 3 Prodorsum with strong and crown-like median crista 4
- Notogaster without strong and crown-like median crista 6
- 4 Notogastral setae phylliform *N. perlucundus* Niedbala, 2000
- Notogastral setae not phylliform 5
- 5 Lamellar and rostral setae thin and smooth; setae v' on femora I absent *N. whakau* sp. nov.
- Lamellar and rostral setae thin and smooth; setae v' on femora I present *N. unicarinatus* Niedbala, 2000
- 6 All setae of anoadanal plates minute 7
- Not all setae of anoadanal plates minute 8
- 7 Lateral carinae present; $in > ex > ro$ *N. brachys* Niedbala, 2006
- Lateral carinae absent; $ex > ro > in$ *N. atratus* Niedbala, 2000
- 8 Two vestigial adanal setae present 9
- No vestigial adanal setae present 10
- 9 Setae ad_2 and ad_3 vestigial *N. australis* Ramsay, 1966
- Setae ad_1 and ad_2 vestigial *N. caliginosus* Niedbala, 1989
- 10 Exobothridial setae vestigial 11
- Exobothridial setae present 12
- 11 Lamellar setae vestigial; notogastral setae more or less similar in length *N. repostus* Niedbala, 1989
- Lamellar setae not vestigial; notogastral setae heterotrichy in length *N. ater* Niedbala, 2000
- 12 Setae d on femora I forked distally 13
- Setae d on femora I not forked distally 15
- 13 Prodorsum with median crista *N. paracapillatus* Niedbala, 2006
- Prodorsum without median crista 14
- 14 Dorsal region of sigillar fields strong and bifurcate anteriorly; posterior furrows present
- Dorsal region of sigillar fields weak and not bifurcate anteriorly; posterior furrows absent
- *N. quietus* Niedbala, 1989
- *N. rotoitiensis* Niedbala, 2006
- 15 Lateral carinae present 16
- Lateral carinae absent 18
- 16 Interlamellar setae short and fine, slightly longer than lamellar setae *N. conspicuus* Niedbala, 1989
- Interlamellar setae long and thick, more than twice longer than lamellar setae 17
- 17 Lamellar setae minute, much shorter than interlamellar setae; setae ad_3 thin and minute, similar to genital setae . .
- *N. incomparabilis* Niedbala, 2000
- Lamellar setae longer, about 1/3 long of interlamellar setae; setae ad_3 thicker and longer than genital setae
- *N. uncinulus* Niedbala, 2000
- 18 Notogastral setae heterotrichy in length *N. fecundus* Niedbala, 2000
- Notogastral setae more or less similar in length 19
- 19 Notogastral setae flagellate *N. bonangensis* Niedbala, 2006
- Notogastral setae not flagellate 20
- 20 Notogastral setae short ($c_1/c_1 - d_1 < 0.5$), spiniform and rough 21
- Notogastral setae long ($c_1/c_1 - d_1 > 0.5$), thick and spinose 22
- 21 Interlamellar setae long, almost 4 times longer than lamellar setae *N. aquilus* Niedbala, 2000
- Interlamellar setae not so long, slightly longer than lamellar setae *N. maurus* Niedbala, 2000
- 22 Setae ad_3 thicker and longer than genital setae *N. matatipū* sp. nov.
- Setae ad_3 thin and minute, similar to genital setae 23
- 23 Pedicel of sensilli longer than head; setae ps_4 situated anterior to setae ad_1 *N. claviger* Niedbala, 1993
- Pedicel of sensilli shorter than head; setae ps_4 situated posterior to setae ad_1 *N. dugdalei* sp. nov.

Discussion

The fauna of ptyctimous mites of New Zealand was poorly studied. Till now, 45 species were recorded in this region and nearly 90% of the species were described after 1989. The genus *Notophthiracarus* belongs to the family Phthiracaridae which is the most diverse group in ptyctimous mites. Among all phthiracarid mites reported from New Zealand, *Notophthiracarus* species accounted for 64%, representing 21 species. This work added three new species of *Notophthiracarus*. In all known species of this genus, 17 species are only reported in New Zealand (*N. australis*, *N. aquilus*, *N. ater*, *N. atratus*, *N. brachys*, *N. caliginosus*, *N. comatus*, *N. fecundus*, *N. incomparabilis*, *N. maurus*, *N. paracapillatus*, *N. tripartitus*, *N. uncinulus*, *N. unicarinatus*, *N. dugdalei* sp. nov., *N. matatipiu* sp. nov., and *N. whakau* sp. nov.). Other seven species—*N. bonangensis*, *N. claviger*, *N. conspicuus*, *N. quietus*, *N. repostus*, *N. perlucundus*, *N. rotoitiensis*—also occur in Australia continent and surrounding islands (Tasmania and New Caledonia). All these species are distributed in Australian Region. New Zealand has 24 (over 17%) of the total species in this genus (more than 140 species in the world) and as many as 17 (71% of the total) species are endemic to New Zealand (cf 82% endemicity for oribatid fauna as a whole, Hammer 1968).

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